February 2014

Quiz1

Perform the following operation in binary:

a- 110000 – 11111

10001

b- 100011 : 1011

11.001... ← the answer

Perform the following conversions:

$(10001)_2 = (17)_{10}$

$(-25)_{10} = (\ )_{2's\ comp}$ n=7

$= (1100111)_{2's\ comp.}$

$(30)_{10} = (\ )_{1's\ comp}$ n= 6

$= (011110)_{1's\ comp.}$

$-25 = 10.11001 \rightarrow 0100111$

0100110

$(25)_{10} = (0011001)_2$

1's comp = 1100110

1 +

1

25 | 2 | 1
12 | 2 | 0
6 | 2 | 0
3 | 2 | 1
1 | 2 | 1
0

30 | 2 | 0
15 | 2 | 1
07 | 2 | 1
3 | 2 | 1
1 | 2 | 1
0

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16 8 4 2 1

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Quiz 2

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Perform the following operations in 2's comp representation. Word size = 5. Indicate if an overflo occured.

1 comp.

10 = 1010 → 0101 → 0110

9 = 1001 → 0110 → 0111

① $(-10 - 9)_{10}$

wrong

-10 = 10110

-9 = 10111

overflow = 101101 wrong

② $(-16 + 5)_{10}$

-16 = 10000

5 = 00101 +

10101 Correct

16 = 10000 → 01111 → 10001

5 = 0101

Simplify the following:

$a + bcd + \bar{a}bc + bc\bar{d}$

$= a + bc + bcd + bc\bar{d}$

$= a + b(c + bcd + c\bar{d})$

$= a + b[c(1 + d + \bar{d})]$ (1)

$= a + bc$

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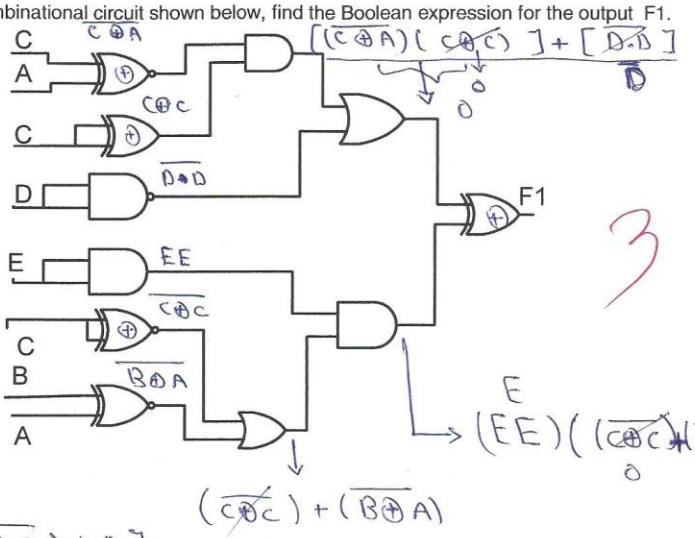
Quiz3 **March 2014**

(a) For the combinational circuit shown below, find the Boolean expression for the output F1.



$[(C \oplus A)(C \oplus C)] + [D \cdot D]$

$(C \oplus C) + (B \oplus A)$

$E(EE)((C \oplus C)(B \oplus A))$

$[(\overline{C \oplus A})(0)]$

$F1 = [E(\overline{B \oplus A})]$

$= [0] \oplus [E(\overline{B \oplus A})]$

(b) Simplify the following function using consensus theorem:

$$C(X,Y,Z) = Y \oplus Z + XZ + \overline{(X \oplus Y)}$$

$= \bar{y}z + y\bar{z} + xz + \overline{(x\bar{y} + \bar{x}y)}$

$= \bar{y}z + y\bar{z} + xz + \bar{x}x + \bar{x}\bar{y} + yx + y\bar{y}$

$= \bar{y}z + y\bar{z} + xz + \bar{x}\bar{y} + yx$

$= \bar{y}z + y\bar{z} + \bar{x}\bar{y} + yx$

$= $

$(\overline{x+y})(\overline{\bar{x}y})$

$= (\bar{x}+y)(x+\bar{y})$

$= \bar{x}x + \bar{x}\bar{y} + yx + y\bar{y}$

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QUIZ 4

A combination logic circuit has 3 inputs **A**, **B**, and **C**. It has one output **Z**, where **Z** is **HIGH** when the majority of inputs are **HIGH**. Design the circuit by finding the following:

a. The truth table.
b. The minterm expansion of **Z** in Decimal form.
c. The Maxterm expansion of **Z** in Decimal form.
d. The Maxterm expansion of **Z'** in Decimal form.

a b c	Z	
0 0 0	0	
0 0 1	0	
0 1 0	0	
0 1 1	1	3
1 0 0	0	
1 0 1	1	5
1 1 0	1	6
1 1 1	1	7

$\Sigma m = m_3 + m_5 + m_6 + m_7$

$= \bar{a}bc + a\bar{b}c + ab\bar{c} + abc$

$\Pi M = M_0 \cdot M_1 \cdot M_2 \cdot M_4$

$= (a+b+c)(a+b+\bar{c})(\bar{a}+b+c)(a+\bar{b}+c)$

$Z' \quad \overline{\Pi M} = M_3, M_5, M_6, M_7$

$= (a+b+c)(a+b+\bar{c})(a+\bar{b}+c)(\bar{a}+b+c)$

$= \bar{a}\bar{b}\bar{c} + \bar{a}\bar{b}c + \bar{a}b\bar{c} + a\bar{b}\bar{c}$

$\Pi M(3, 5, 6, 7)$

May 2014

Quiz7

a) Derive the next state (characteristic) equation for T- Flip-Flop.

T	Q	Q^+
0	0	0
0	1	1
1	0	1
1	1	0

$Q^+ = \bar{T}Q + T\bar{Q} = T \oplus Q$

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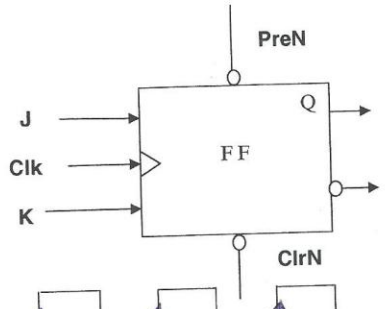
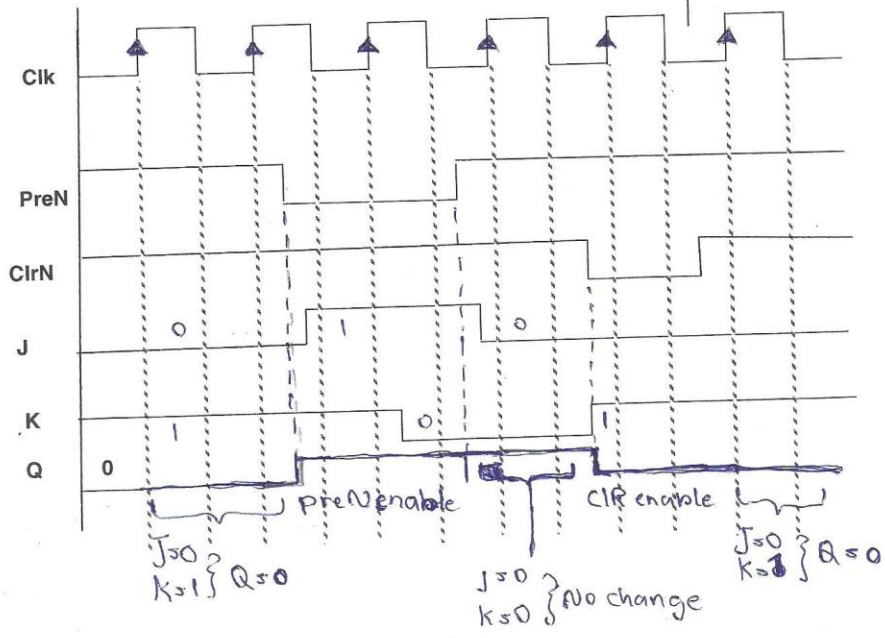
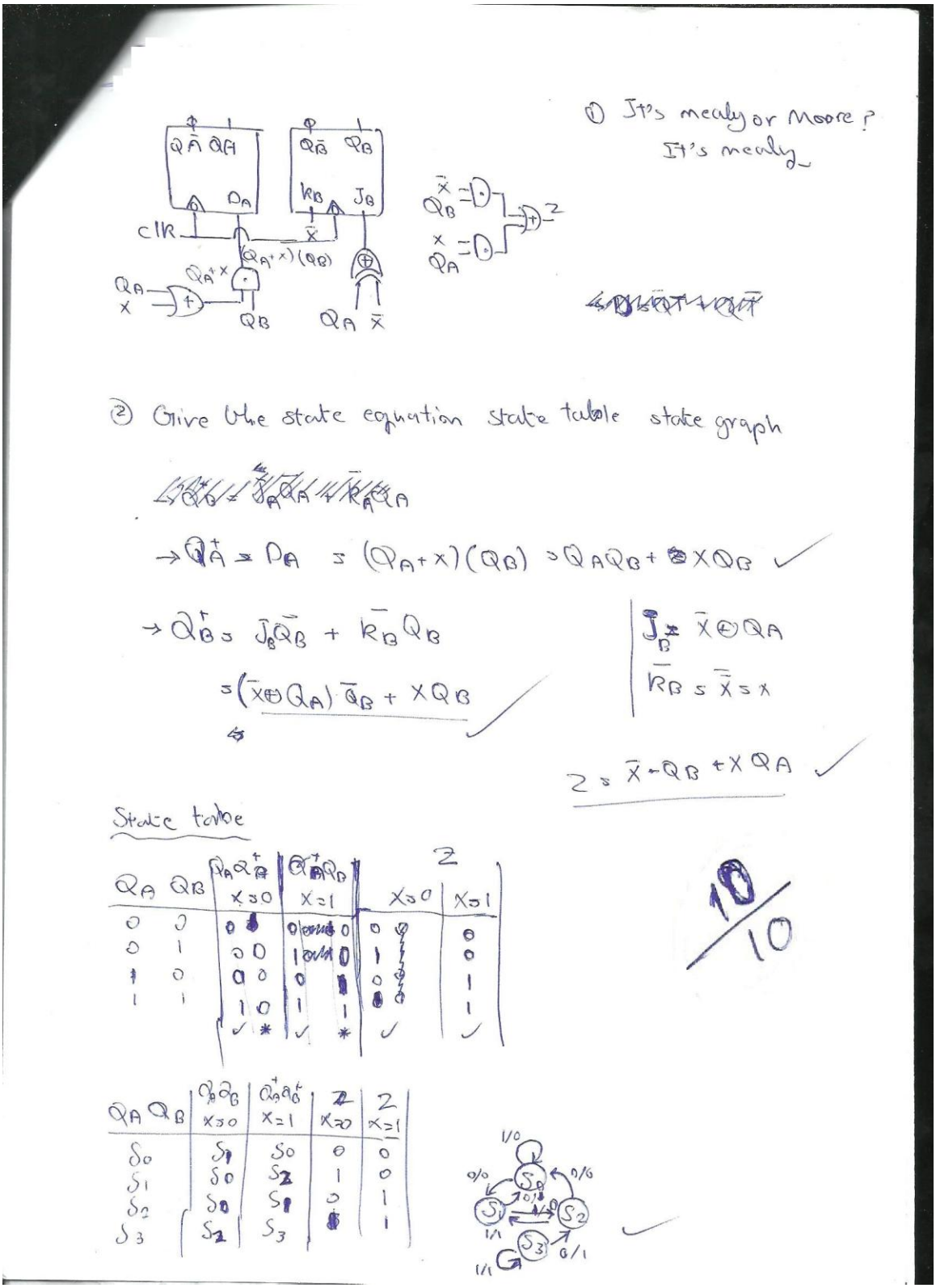
b) Complete the following timing diagram for the following J-K Flip Flop.

J	K	Q^+
0	0	No Change
0	1	0
1	0	1
1	1	$\bar{Q}$





Quiz8



① It's mealy or Moore ?
It's mealy

② Give the state equation state table state graph

$\rightarrow Q_A^+ = D_A = (Q_A + x)(Q_B) = Q_A Q_B + x Q_B$ ✓

$\rightarrow Q_B^+ = J_B \bar{Q}_B + \bar{K}_B Q_B$

$= (\bar{x} \oplus Q_A)\bar{Q}_B + x Q_B$ ✓

$J_B = \bar{x} \oplus Q_A$

$\bar{K}_B = \bar{\bar{x}} = x$

$z = \bar{x} \cdot Q_B + x Q_A$ ✓

State table

Q_A	Q_B	$Q_A^+ Q_B^+$ $x=0$	$Q_A^+ Q_B^+$ $x=1$	z $x=0$	z $x=1$
0	0	0 0	0 1	0	0
0	1	0 0	1 0	1	0
1	0	0 0	0 1	0	1
1	1	1 0	1 1	0	1
		✓	*	✓	✓

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Q_A Q_B	$Q_A^+ Q_B^+$ $x=0$	$Q_A^+ Q_B^+$ $x=1$	z $x=0$	z $x=1$
S_0	S_1	S_0	0	0
S_1	S_0	S_2	1	0
S_2	S_0	S_1	0	1
S_3	S_2	S_3	0	1